UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
http://www.epa.gov/region08

DEC 11 2000

Ref: 8EPR-SR

Mr. Kerry Gee
United Park City Mines
PO Box
Park City, UT 84060

RE: October 24, 2000 Draft Sampling and Analysis Plan (SAP) for Richardson Flats RI/FS

Dear Mr. Gee:

The U.S. Environmental Protection Agency (EPA) and the Utah Department of Environmental Quality (UDEQ) have reviewed the referenced document and cannot approve the SAP at this time. The following comments are provided. These comments do not address comments provided directly by the U.S. Fish and Wildlife Service.

General Comments

1. The title of the document should be changed to reflect the purpose of this sampling event. The current title is too general, as additional SAP's or addendums to support different aspects of the RI/FS are likely in the future. We suggest "(Draft) Sampling and Analysis Plan, Remedial Investigation, Richardson Flat." Also, at this point in the RI process, it is very likely that additional RI data collection not discussed in the SAP will occur later. It should be made very clear to the outside reader that this SAP covers only specific data collection activities which are scoped at this time and additional data collection will occur in the future, primarily to support risk assessment activities.

2. The primary purpose of any remedial investigation (RI) is to define the nature and extent of contamination and to estimate the degree of risk posed to human health and the environment. The introductory sections of the SAP (Section 2.2) should make these general points clear and should build the foundation for more detailed objectives later in the document (Section 2.3). For this type of sampling event, the reader should be able to be trace *every* sample back to a detailed objective which supports one of those two basic objectives.

3. Most of the sampling in an RI is risk-based. That is, the primary purpose is to determine if the site is presenting unacceptable risk and, further, what contaminants, media, and areas are presenting the risk. This initial round of sampling proposed by UPCM is no exception, though it focuses primarily on human health concerns. For this type of sampling, development of a site conceptual model during planning is critical. A site conceptual model and text describing its development and use are missing from the draft SAP. In EPA's comment letter on UPCM's draft

RI/FS work plan (November 19, 1999), Item 12 specifically recommended the development of a site conceptual model, in conjunction with the EPA toxicologist, prior to development of a sampling plan.

A site conceptual model utilizes existing information to show: (1) what general contaminants are present, (2) what media they are present in, (3) release mechanisms for the contaminants (actual or potential), (4) potential pathways for exposure, and (5) potential receptors which could be exposed to the contamination based on current and future land use. Separate models are sometimes prepared for human and ecological receptors, depending upon the complexity of the site. Through a rational presentation and discussion of all of this information (usually graphically with supporting text), data gaps can be distinguished and data collection needs are made clear. This translates into detailed sampling objectives (Section 2.3). As the investigation progresses, the model is refined until an accurate estimate of risk is achieved. Such models make data collection rationale simpler and data collection more efficient and complete.

In the EPA-approved RI/FS Work Plan (September 2000) for the RI/FS, UPCM developed and discussed a "preliminary site model." More information is included in this SAP. This preliminary site model can form much of the basis for parts of the risk-based site conceptual model(s), but it is not a complete risk-based model. The primary EPA site toxicologist, Dr. Susan Griffin, is also available to provide guidance and assistance.

4. Overall, the development of the sampling program in the SAP should proceed this way:

(1) Presentation of the general goals for this sampling event
(2) Presentation and discussion of existing information on the site
(3) Use of that existing information to develop a site conceptual model
(4) Use of the site model to identify data gaps, clear objectives, and decision points
(5) Use of the seven step DQO process to identify a sampling program to meet those objectives, identify any decisions to be made, and how those decisions will be made. Information on the DQO process and its use can be found in EPA QA/G-4 (August 2000). Following the DQO process is critical to ensure data collected is adequate and sufficient.

5. It appears that many of the samples proposed by UPCM are intended to address both human health and ecological concerns. For instance, site boundary delineation applies to any receptor. However, as we have discussed numerous times, EPA has insufficient information compiled at this point to offer specific guidance for collection of ecological-risk based data. I have proposed technical assistance meetings beginning this winter to begin addressing ecological data collection process. Therefore, review of this SAP focused on human health concerns which are more defined at this point. Wherever possible, limited guidance or recommendations regarding ecological risk are made, generally to try to limit the need for redundant data collection in the future.

6. The SAP is generally weak in the area of data review and assessment. Specific comments are provided below for the relevant sections. The SAP also did not include all of the areas

recommended in EPA QA/R-5 (November 1999). These include Special Training/Certification (A8), Documents and Records (A9), Instrument/Equipment Testing, Inspection and Maintenance (B6), and Data Management (B10). Note that these sections do not necessarily have to be extensive (and are not required in EPA Region 8), but should be sufficient in detail to address the problem and to provide evidence that a process is in place prior to project implementation - a particular concern is data management. In some cases, only a sentence or two should suffice.

Specific Comments

6. Section 2.0. Please include a distribution list of individuals and their organization who will receive copies of the approved SAP and any subsequent revisions.

7. Section 2.1. The UDEQ, DERR project manager is Muhammad Slam. Also, the oversight role of EPA and UDEQ should be discussed.

8. Section 2.2, Page 5, last paragraph. EPA and UDEQ recognize that UPCM feels strongly that no further remedial measures are necessary at this site. This is reflected in language included in the RI/FS Work Plan. However, in the SAP, we feel there is no need for this long section early in the document which virtually reiterates the same language from the Work Plan. It would be more appropriate, and more effective, to identify actions taken voluntarily by UPCM, and then to evaluate existing site conditions (including past UPCM mitigative work) in terms of a risk-based conceptual site model rather than generally in the beginning of the document. If indeed past work has mitigated risk, it will be reflected in the conceptual site model.

9. Section 2.2.1, Page 7, 1st paragraph. See general comment #3 above for discussion on "preliminary site model" presented in the RI/FS Work Plan and the need for a conceptual site model as a foundation of this SAP.

10. Section 2.2.1.1, Page 7. Please clarify if ALL tailings have been covered.

11. Section 2.2.1.2, Page 8. This section states that "If the data do not meet QA/QC goals the data will be used to guide decisions based on a qualitative basis." Data that does not meet QA/QC requirements should not be used for decision making. EPA suggests the statement be revised to read: "If the data do not meet the QA/QC goals, the data will not be used in decision making directly. Rather, these data will be used to optimize the data gathering process and additional data points that meet QA/QC requirements will be collected and used for decision making."

12. Section 2.3, Page 13. As discussed in general comment #3 above, the objectives of the sampling plan are too generic. From our past conversations, I am sure that you are not attempting to get all of the data UPCM or EPA/UDEQ will need to make decisions on this site through this single event. Therefore, it needs to be very clear which objectives you are attempting to meet so we can evaluate the adequacy of this plan. These objectives should stem primarily from the conceptual site model and one/both of the two primary objectives discussed in general comment #2 above. Only when objectives are clear and specific can EPA determine if the

sampling locations & method, frequency, detection limit, etc. will meet those objectives. Based on the understanding I have on what you are trying to achieve, *example* objectives might include:

For soils & tailings:

- Determine the level of contaminants in imported impoundment cover soils. Provide data of sufficient quality and quantity for analyzing risks to human health and for comparison with ecological screening levels and background. Verify depth of imported impoundment cover.
- Screen for impacts to off-impoundment soils and delineate the site boundary. Delineate all areas of potential impacts through the use of human and ecological soil screening levels.
- Collect data on composition and chemical qualities of tailings to evaluate their long-term fate and chemical stability.

For surface water & sediments:

- Collect sediment data in the south diversion ditch to aid in identification of location of metal loading within the ditch. Use data to aid in long-term fate and chemical stability modeling and in ecological risk assessment.
- Collect data in Silver Creek and in drainages associated with the site to aid in determination of the background water quality relative to the site and the site's impact on water quality in Silver Creek, including seasonal variations. Provide additional surface water data for comparison with human health and ecological screening levels.

For ground water:

- Screen for impacts to shallow alluvial ground water associated with Silver Creek.
- Collect data to investigate the interaction between shallow ground water and Silver Creek, including seasonal variations.

12. Section 2.4. The bullets in this section define the difference between screening data and definitive data. A couple of important components that distinguish definitive from screening data are not adequately captured. First, in order to be used in the decision-making process, screening data must be confirmed via a method that generates definitive data. As currently written, the SAP does not identify data generation techniques that fall into the screening data category; therefore, definitive confirmation is not required. Secondly, definitive data may be generated <u>at the site</u> or <u>at an off-site location</u> (EPA Superfund Data Categories, September 1993). Therefore, pH data and water level measurements may be considered definitive for their intended uses, providing sufficient evidence exists to demonstrate that procedures were followed and data were generated and documented in accord with project requirements. It is recommended that both bullets, defining screening and definitive data, be removed from the SAP. The SAP should require sufficient QA/QC to ensure that all data collected for this project and used in decision-making are definitive in nature.

Similarly, the section states that "All data collected during the RI/FS, except for decontamination

water samples collected for pH testing in the field, will be considered "definitive"..." This statement is an important one, but should be revised to read as follows: "All data generated during the RI/FS is intended to be collected for use in site characterization and risk assessment; therefore, definitive data (data of known quality) are required for all aspects of this project."

13. Section 3.0. Many of the proposed sampling events discussed in the Work Plan and presented in the SAP are intended to *screen* for impacts. If there are no unacceptable impacts (for example below screening levels or at background levels), then no further sampling will be necessary. However, if impacts are found, additional sampling *may* be needed to completely characterize risks to human health or the environment. This depends on factors such as nature and extent of contamination, land use, and potential ecological concerns we have not yet discussed in any detail. This is particularly true for off-impoundment soil sampling and should clearly be reflected through the DQO process.

14. Section 3.0. An important screening criteria for any media is background. Additional discussion on background needs to be included in the document. The text mentions that one "background" soil sample was collected in 1984. Unless additional and adequate historical data are available, this is a significant data gap which needs to be addressed in this SAP.

15. Section 3.0. Along the lines of a conceptual model and clear objectives, it would be helpful to present a table which summarizes the specifics and purpose for each sample set (corresponding to Sections in 3.1). This could be an expansion of Table 5. Suggested headings include: Media; Objective; Location, Analytes.

16. Section 3.1.1. The SAP did not address the small pond located on the west side of the tailings impoundment. Is sampling contemplated for this area under this SAP?

17. Section 3.1.2. Please clearly state in the text the name of the proposed ground water monitoring wells so they can be more easily identified on Figure 4. Also, clearly state if ground water samples with be analyzed for total and/or dissolved metals.

18. Section 3.1.3. UPCM has proposed a "screening" criteria for cover soils of 500 ppm lead and 250 ppm arsenic. If levels in soil exceed those amounts, additional analysis is proposed. There is no rationale in the SAP to explain or support these screening criteria. We understand this is an attempt to reduce sampling costs, and that for mining sites, lead and arsenic are frequently the primary metals of concern regarding human health. However, the choice of lead and arsenic as "screening contaminants" and the associated levels are arbitrary at this point and should not be used as proposed at this point in the investigation.

An alternative approach should be proposed, one that considers all potential site contaminants intitially. We cannot recommend an alternate procedure/screening rationale without first defining the full objectives of the impoundment sampling. For instance, does UPCM intend to use this sampling to screen for potential ecological impacts due to cover soils?

19. Section 3.1.3, Soils Cover Sampling. Off-site soil sampling (wind blown tailings) is discussed

in this section, though it has nothing to do with the impoundment cover. Please revise the title of this section or make a separate section to discuss off-site soil sampling.

20. Section 3.1.3 and Associated Soil Sampling SOP. For human health risk assessment purposes, current EPA policy and guidance requires bulk soil samples be sieved to <250 microns. The <250 micron fraction is then analyzed for metals. If these samples are intended to be used for human health risk assessment purposes, this protocol should be followed. For ecological screening/risk assessment purposes, sieving should not occur.

21. Section 3.1.4. All soil and sediment samples should be analyzed on a dry weight basis.

22. Section 3.1.5. It is recommended that a backhoe not be used due to the substantial disturbance and mixing that may occur. Also, for off-impoundment tailings, UPCM proposes to install monitoring wells ONLY if ground water is encountered during investigation. Ground water levels vary over time, and may not be present at the time sampling occurs, but could be present at other times. Please address.

23. Section 3.2.3.2. This section notes that samples will be collected in a "plastic bag." This is inconsistent with Table 2 which specifies a "glass jar" will be used.

24. Section 3.5. If field equipment is decontaminated on site or used at different locations, equipment rinsate blanks should be collected.

25. Section 4.1, Assessments and Response Actions (C1). This section is quite brief and does not adequately include all the components required in the EPA guidance. According to EPA QA/R-5, this section should provide detail on assessments to be employed during the project. Assessments can and often should occur during the sampling and data acquisition phases of the project. They provide a proactive means for assessing the processes and procedures employed during data generation allowing for sufficient time to make corrections, if necessary. Assessments can be in the form of field and/or laboratory technical systems audits, data quality audits or validation, and performance evaluations, among others. In addition to describing the type(s) of assessments that will be used, this section should also provide: the planned frequency for each proposed assessment; the personnel and/or agency responsible for the assessment activity; and the corrective action procedures for each assessment. Using EPA QA/R-5 as a guide, describe what type and frequency of assessments are planned. Also, ensure that UDEQ is also listed as a recipient of deliverables (page 27).

26. Section 5.1, Data Review, Validation and Verification Requirements (D1). This section indicates that the requirements and methods for data validation and verification are listed in Tables 3 and 4. EPA agrees that use of the tables is a convenient way to supply data verification components; however, these tables should be refined to include additional information.. Comments pertaining to these tables are provided below.

Table 3

- The table appears to address PARCC components as they pertain primarily to field

QC samples. To be complete, PARCC components for laboratory QC samples should also be included (e.g., instrument blanks, laboratory method duplicates, post-digestion spikes). If a table is prepared similar to the one provided in Attachment A, all pertinent QC criteria and corrective action will be addressed in a single table. Provide the laboratory control limits for both the matrix spikes and laboratory control samples in the next revision. The "Summary of QA/QC Goals" can then be removed from this table.

- Precision. Under Evaluation Criteria: replace "reproducibility" with RPD for the matrix spike/matrix spike duplicate pair.

- Accuracy. Under QC Program: Please clarify what Lab-Specified Historical limits are and how they are used.

- Comparability. Under QC Program: Remove Field Duplicate Pairs.

- Completeness. Under Evaluation Criteria: Provide a definition for "valid".

Table 4
The information contain in this table is a summary of activities that should occur when assessing the data. As stated previously, it does not provide sufficient detail to perform a validation or verification and then assign data qualifiers as a result of that review.

27. Section 5.2, Validation and Verification Methods (D2). This section states that data validation and verification will be conducted on a minimum of 90% of samples. However, this statement is vague in three important areas: a) definitions of validation and verification; b) rationale for application of the 90% rate for validation and verification; and c) steps used for data qualification during validation and verification.

A) For your convenience, Superfund's working definitions for data validation and verification are provided below:

Data Verification: A consistent, systematic process that determines whether the data have been collected in accordance to the specification as listed in the contract requirements included within the approved Quality Assurance Project Plan (QAPP). This process is independent of data validation and is conducted at various levels both internal and external to the data generator (laboratory).

Data Validation: An evaluation of the technical usability of the verified data with respect to planned objectives. Data validation is performed external to the data generator (laboratory), using a defined set of performance criteria to a body of data in the evaluation process. This may include checks on some or all of the calculations in the data set and reconstruction of some or all final reported data from initial laboratory data (e.g. chromatograms, instrument

printouts). It is in the data validation process that data qualifiers for each verified data are evaluated. It extends beyond the analytical method or contractual compliance to protocols or QAPPs to address the overall technical usability of the generated data.

B) This section should indicate whether the rate of 90% applies to both verification and validation or if different fractions of data will be verified and validated. It is common for 100% of the data to be verified both internally at the analytical laboratory and externally by independent reviewers. Independent reviews may be UPCM or a subcontractor experienced in this type of review. Chemical data validation is quite labor intensive and must be performed by a chemist experienced in the data validation and qualification process. Because of this, generally 10% of the data are validated. If problems are uncovered as a result of the validation effort, an outline for handling the further reviews must also be included in this section.

C) This section states "The degree of sample deviation beyond acceptance limits will be evaluated for its potential effect on data usability." EPA agrees that an assessment of data usability must be performed for data generated for this project. The QAPP must define an objective approach for how data are assessed. The data validation effort typically uses *National Functional Guidelines for Data Review* (Inorganic & Organic: February, 1994) to assign application of data quality indicators, if specific qualification requirements are not identified in the QAPP.

28. Figure 1- Richardson Flat RI/FS Organizational Chart. As presented, the organizational chart is misleading at the level of State and Federal agency oversight. The EPA Project Coordinator and the UDERR Project Manager work cooperatively to oversee the work being performed at the Richardson Flat site. The chart should be modified such that it does not appear that Mr. Christiansen oversees work performed by Mr. Thiriot (should be Mr. Slam); but rather, they both oversee work performed by UPCM and its subcontractors. In addition, the organizational chart identifies the ASARCO/AEC laboratory for sample analysis. However, based upon the chart, we are unsure how Frontier Geosciences, Inc. fits into the organizational scheme. Because a Laboratory Quality Assurance Plan (LQAP) was provided in Attachment 12 of the ASARCO/AEC Quality Assurance Manual, we assume that Frontier Geosciences will perform a portion of the analytical work. Please clarify the relationship with Frontier Geosciences as it relates to ASARCO/AEC and the project as a whole.

29. Table 2. Laboratory Reporting Limits are summarized in Table 1. However, the rationale supporting these values as they relate to project requirements is not provided. Identifying the minimum concentration that each target analyte must be detected is a key component of the DQO process. This step ensures that LRLs are sufficient to support end use purposes (e.g., risk assessment). Project-required detection limits are typically established a combination of methods which may include (depending on site-specific conceptual site model): 1) using screening-level values from the Region III Risk-Based Concentration Table or calculated site-specific values; 2) Safe Drinking Water Act Maximum Contaminant Level criteria; 3) Ambient Water Quality Criteria; 40 background; or 5) other State or Federal regulations. The LQAP provides a list of total metals

method detection limits for ICP Methods 6010B/200.7 and 6020/200.8 updated in 1998. A comparison between project requirements and laboratory capabilities must be performed to determine if the selected laboratories are able to meet project requirements or if LRL requirements may be relaxed.

30. Table 2. Provide rationale explaining why both ICP and ICP/MS methods are recommended for metals analysis of each sample. Both ICP and ICP/MS methods are capable of performing a metals scan that provides the results for all metals on the parameter list with the exception of mercury. Therefore, analytical effort may be conserved if only one method is selected. Development of project-required detection limits will also help to determine whether one or both of these methods are necessary.

31. Table 2. This is a nice summary of project requirements, but please revise the table to improve accuracy as follows:

- Change "polyurethane" to "polyethylene".
- Soil holding time of 180 days for chromium must be added.
- Cite Preservative for all metals in water as "2 ml HNO_3 (pH<2)"
- Clarify the units in the LRL column. For example, identify which rows have units of ppm, which are ppm based upon dry weight, and the units for conductivity.
- To ensure that solid samples may be reported on a dry weight basis, add percent moisture to the parameter list.
- Provide the reference for hardness method (e.g. Standard Methods, 20th ed.)
- Change the holding time for hardness to 180 days, since it is a calculation that uses calcium and magnesium results measured by ICP.
- Reference pH method as EPA 150.1.
- Change the analytical method for sulfate from SW-846 9036 to EPA 375.2 and change preservative and/or bottle selection accordingly.
- It is not necessary to collect an additional bottle (Bottle 3) for calcium, potassium, magnesium, and sodium. These parameters are captured during the 6010 or 6020 metals scan.
- Change the holding time for carbonate and bicarbonate to 14 days as these parameters are analyzed with alkalinity.
- Change the holding time for sulfate to 28 days.
- Ensure the most recent test method is used. For example, method 6010B should be used instead of method 6010.
- Lastly, at this point it is difficult for EPA to state whether the methods and detection limits proposed are sufficient because of the lack of clear objectives and DQO process in the document.

You may want to consider having the lab measure the temperature of the cooler upon receipt to ensure proper temperature was maintained, especially for mercury. EPA allows a range of temperature of 4°C ± 2°C.

32. Standard Operating Procedures (SOPs). The SOPs provided as an attachment to the SAP were

reviewed. Several important components appeared to be consistently omitted. Standard Operating Procedures (SOPs) should be written with the understanding that the information contained within them will be used in the field by samplers who may not be familiar with the overall project goals and may have limited experience with the or performance of the activity or procedure. SOPs must be written to serve as a step-by-step guide and must include all steps necessary to complete a procedure from start to finish (including equipment decontamination and field documentation). The EPA has a guidance document available to assist in the development of SOPs: Guidance for the Development of Standard Operating Procedures for Quality-Related Documents EPA QA/G-6 (November 1995). This and other useful quality assurance documents and guidelines are available online at: http://www.epa.gov/r10earth/offices/oea/qaindex.htm.

Specific comments on each SOP were not prepared; however, an example of components that should be addressed is provided below for one SOP:

RMC SOP 1

- Sampling Equipment. This section provides a list of equipment needed for surface water sampling. Each item should include a description and/or definition of the item; in cases where the item is optional ("if necessary"), then an explanation of when the item is required should also be included.

- Dissolved Metals and Total Metals Analysis. Both sections state that the samples will be "preserved with 2 ml of NO_3". Please replace "NO_3" with "nitric acid (HNO_3)". Additionally, these sections state: "...sufficient to bring the sample to pH < 2". Include the following sentence: "The pH level in the samples will be verified using pH paper before bottles are sealed."

- Dissolved Metals Analysis. This section states that "samples will be field filtered". A description of the steps and equipment necessary to perform field filtering must be included in this section.

- Cations/Anions and Total Suspended Solids. Details outlining the steps for collection and preservation of these samples has been omitted and should be included in the next version of the SOP.

- Documentation. A section describing the information that must be recorded in the field notebook and log forms must be incorporated into the next version of the SOP. In addition, this section should reference the sample handling and documentation SOP (RMC SOP 5).

33. Laboratory Licenses & Laboratory Quality Assurance Plan.

- The environmental laboratory license presented in the QAPP Appendices that was issued to ASARCO/AEC by the Arizona Department of Health Services expired on January 20, 2000. Please provide a copy of the updated license in the next version of the QAPP. Also, is the lab certified by the State of Utah? A Utah certified lab should be used.

- How are data generated at the ASARCO/AEC lab going to be submitted to UPCM? (Electronically and/or hardcopy?) This information is not contained in the Laboratory Quality Assurance Plan (LQAP). Rather than update the LQAP, UPCM may address this concern in the Data Management section of the SAP.

- Section VIII Data Reduction, Validation and Reporting, page 9. LQAP contains sections that appear to have been developed solely for a single type of analysis (ICP 6010B) as it provides specific accuracy requirements for this method (e.g., ICV/CCV between 90-110% recovery). While this defect should be corrected in the next edition of the LQAP, EPA considers this aminor problem as other areas of the LQAP (Table: Quality Control Requirements) exhibit an understanding that each analytical method has QC criteria. However, because the LQAP contains inaccurate precision and accuracy requirements and data review and validation procedures, the SAP should specifically state the precision and accuracy requirements and the data review and validation procedures for the methods selected for the project. Additionally, the SAP should include a statement indicating that if contradictions between the various documents are identified, the information contained in the SAP supercedes all other documents.

- Holding Times. This LQAP should include a list of specific holding times for the target analytes performed at the laboratory.

- Attachment 4, Central Logbook Record. The contents of this attachment are missing.

- Attachment 7, Method Detection Limits. This section provides a summary of total metals method detection limits (MDLs) for ICP Methods 6010B/200.7 and 6020/200.8. The units are identified as "ppb". While it is inferred that the MDLs are for water matrix (based upon the cited mercury method reference and levels of detection), this table should be revised to indicate for which sample matrix these detection limits apply. Soil method detection limits are typically 100 times higher than water MDLs; these limits should also be provided in the LQAP. Additionally, analysis of the MDLs occurred in 1998. EPA recommends that MDLs be updated or confirmed a minimum of annually.

- Attachment 12. The LQAP for Frontier Geosciences appears complete, but the certifications are not included as suggested by the list of contents provided on the "Appendices" cover page.

34. Lastly, the entire document needs a grammar and spell check. Specific examples noted include:

- Page 5. The acronym EPA is not previously defined.
- Page 6. "RI/FS final reports" should be changed to "final RI/FS report."
- Page 11, Section 2.2.1.3. Section is numbered out of sequence.
- Page 14, Section 2.4. Delete "and removal actions" from first sentence.
- Page 15, Section 3.0. 2nd paragraph, 3rd sentence. Replace "will b tied" with "will be tied"
- Page 19, Section 3.1.5. 2nd line, spelling error "long term."
- Page 19, Section 3.1.5. Should read "...down to a depth of 5 feet below the tailings/cover interface."

We appreciate the opportunity to review the document. We tried to be as specific as possible; however, in some cases it is difficult for us to review specifics of your plan when general development principles are incomplete (ie site conceptual models, DQOs). Because of this, a second review cycle will likely be required. UPCM may also wish to add some data collection activities based upon upcoming discussions on ecological risk assessment. We will be able to provide more specific guidance on ecological-based data collection activities during and after these discussions.

Also, for your convenience and assistance, we have included several "example" documents which may assist UPCM in addressing several of the points detailed in our comments. These include:

(1) Excerpts from the Quality Assurance Project Plan for the Ogden Rail Yard Site. This QAPP is strong in the areas of data review and assessment.

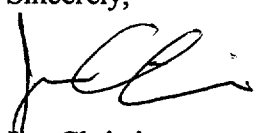
(2) Excerpts from the Project Plan for the Vasquez Boulevard & I-70 (VB & I-70) Site. This QAPP is particularly strong in the area of DQO's and data management/storage. Please keep in mind that objectives in the sampling proposed by UPCM are different, and in some cases much simpler, than those detailed in the VB & I-70 Site. For instance, much of the sampling proposed by UPCM under this SAP are intended to screen for contamination. The DQO process for this type of sampling is more straight forward than a statistical analysis necessary in some cases - it is the process and methodology employed in the VB & I-70 QAPP that is important.

(3) Example Standard Operating Procedures.

(4) Example Text for Assessment and Response Action (Section C1 of QA/R-5).

Additionally, the site chemist, Mary Goldade, and site toxicologist, Dr. Susan Griffin, will gladly work with UPCM on specific risk assessment and data quality management issues. Dr. Dale Hoff, our ecotoxicologist, will be meeting with UPCM shortly to begin the ecological risk assessment process. I will be glad to organize further assistance if necessary; I can be reached at (303) 312-6748.

Sincerely,



Jim Christiansen
Remedial Project Manager

Attachments - 4

Attachment 1 - Excerpts from Ogden Rail Yard QAPP

in original JK

Attachment 2 - Excerpts from VB & I-70 QAPP

in original

Attachment 3 - Example TSOP's

TECHNICAL STANDARD OPERATING PROCEDURE

EXAMPLE TEXT

Date: Sept. 16, 1999 (Rev. # 2) SOP No. ISSI-VBI70-01

Title: SAMPLE IDENTIFICATION AND TRACKING PROCEDURES

APPROVALS:

Author ISSI Consulting Group, Inc. June 10, 1999
Original Date

SYNOPSIS: A standardized method for sample identification and tracking for the Phase III Surface Soil Investigation is provided.

Received by QA Unit:

REVIEWS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Region 8		
ISSI Consulting Group, Inc.		

Revision Date	Reason for Revision
July 30, 1999	Included another sample identifier for archived bulk fraction soils.
Sept. 16, 1999	Included another sample identifier for archived raw soils.

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for uniquely identifying and tracking samples collected during the Phase III Surface Soil Investigation at the VBI70 site. This SOP is to be used by employees of USEPA Region 8 contractors/subcontractors supporting USEPA Region 8 projects and tasks. This SOP describes both the nomenclature which will be used to identify samples and outlines the measures by which samples will be tracked throughout the collection process. Site-specific deviations from the procedures outlined in this document must be approved by the USEPA Region 8 Remedial Project Manager or the Regional Toxicologist prior to initiation of the sampling activity.

2.0 RESPONSIBILITIES

Successful execution of the Project Plan requires a clear hierarchy of assigned roles with different sets of responsibilities associated with each role.

The Field Project Leader (FPL) may be an USEPA employee or contractor who is responsible for overseeing the sampling activities. The FPL is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the Project Plan. It is the responsibility of the FPL to communicate with the Field Personnel specific collection objectives and anticipate situations that require any deviation from the Project Plan. It is also the responsibility of the FPL to communicate the need for any deviations from the Project Plan with the appropriate USEPA Region 8 personnel (Remedial Project Manager or Regional Toxicologist).

Field personnel performing sampling are responsible for adhering to the guidelines established within this SOP.

3. 0 SAMPLE NOMENCLATURE

All samples collected during this study will be assigned a unique label ("tag number").

Each sample label will consist of three elements, as follows:

PHASE. All labels will begin with the number "3" to indicate that the sample is derived from Phase III of the study.

NUMBER. Each label will include a unique identification number. This number will be a 5-digit sequential number starting with "00001" and progressively increasing until the final sample has been collected or tag number "99999" has been reached.

SAMPLE PREPARATION. Samples will be categorized based upon the sample preparation performed. Categories include, but are not limited to:

R — Raw sample. Original sample collected during Phase III that is unprocessed.

RA — Archived raw soil. This sample has been homogenized and then archived for future use.

A — Archived bulk fraction. This sample is prepared by sieving the raw sample and then archiving for future use. This sample is not subjected to heating.

B — Bulk fraction. This sample has been prepared by sieving the sample to < 2 mm and then heating above environmental temperatures (> 50 °C).

F — Fine fraction. This sample has been dried at environmental temperatures (< 50 °C) and then sieved to < 250 µm.

Thus, "3-00001-R" and "3-12846-F" represent possible sample numbers collected during Phase III.

Note: The sample preparation nomenclature may be expanded as needed in the future providing they are approved by the Project Database Manager or designate.

4. 0 SAMPLE TRACKING

Prior to sample collection, each team will be given blank copies of media-specific data sheets and a set of pre-printed sample identification numbers on self-adhesive labels. There will be two labels for each sample number. The set of labels that are checked out by a team will be documented by the FPL or designate prior to sampling each day using the VBI70 Surface Soil Labels-Master Sheet (Attachment 1).

When a sample of site medium is collected (e.g., yard soil, indoor dust, alleyway soil), a self-adhesive label will be transferred from the pre-printed sheet to the sample container. At the same time (before collection of any other sample), the second copy of the sample number will be transferred to the appropriate location on the data sheet. The sample data sheet will be filled out at the time of sample collection by the sample collection team. This sheet will contain all relevant information necessary to properly identify the sample. An example data sheet is provided in Attachment 2. All data sheets will be maintained in three-ring binder logbooks. Each sampling team will have a separate logbook.

Because the sample identification number is not a self-reading or immediately decipherable, it is critical that the supporting sample data sheet be filled out legibly, accurately and completely. Notes should be as descriptive and as inclusive as possible such that a person reading the entries, who is independent of the sampling effort, should be able to reconstruct the sampling situation from the recorded information. Language should be objective, factual, and free of personal feelings and inappropriate terminology. Data sheets must be signed by the person recording the information. Any errors or mistakes in field recording must be initialed and dated by the recorder, along with a note explaining the change.

If self-adhesive labels are destroyed and/or voided during sampling activities, this information should be immediately documented in the general logbook for the field team.

5.0 DAILY CLOSE-OUT

Upon completion of daily sampling activities, the sampling team will return to the field office location with samples and corresponding data sheets and any unused labels. It is mandatory that each sample be submitted with its corresponding data sheet. The Field Project Leader or designated sample custodian will verify that the identification numbers on each sample correspond to the data sheet, and that each data sheet is legible and filled out in its entirety. Each data sheet will be copied and the originals will be transferred from the team logbook into a three-ring binder master logbook organized by sample identification number. Once inserted into the master logbook, each data sheet will be

numbered sequentially in the space provided in the lower right corner. Additionally, the sample custodian will maintain a log of the sample identification numbers which have been used, noting any missing or destroyed labels (see Attachment 1). The sample labels and numbers for each team must be rectified at the end of each day. After verification, the samples will be locked and stored according to media. The copies of the sample data sheets will be submitted to the Field Database Manager for entry into the Field Activities Database. Data entry will be performed according to the Data Management Plan established for this project. A flowchart that illustrates the general flow of events is presented in Figure 1.

Attachment 1:

VBI70 Surface Soil Labels – Master Sheet

Logbook DCN_____

VBI70 Surface Soil Labels - Master Sheet

Label #	Check-Out			Check-In			Voided?	Reason
	Sample Team ID	Date	Initials	Sample Team ID	Date	Initials		
3-00001								
3-00002								
3-00003								
3-00004								
3-00005								
3-00006								
3-00007								
3-00008								
3-00009								
3-00010								
3-00011								
3-00012								
3-00013								
3-00014								
3-00015								
3-00016								
3-00017								
3-00018								
3-00019								
3-00020								
3-00021								
3-00022								
3-00023								
3-00024								
3-00025								
3-00026								
3-00027								

Attachment 2:

VBI70 Surface Soil Data Sheet

Logbook DCN _____

ATTACHMENT 1
SURFACE SOILDATA SHEET

PHASE: 3
MEDIUM: SURFACE SOIL
SAMPLE COLLECTION METHOD: ISSI-VBI70-02 Revision 1
DEPTH: 0-2"

DATE: _____

SAMPLE TEAM ID: _____
ADDRESS: _____
House# *Street Name*

BUILDING TYPE: Residential – Single
Multifamily
Apartment

School (Name) – _____

Park (Name) – _____

CLASS: FS (Field Sample)

	SAMPLE NO.:	**SAMPLE TIME:**	**SAMPLE TYPE: (circle one)**
First Sample		_____	COMP GRAB
Second Sample		_____	COMP GRAB
Third Sample		_____	COMP GRAB

NOTES:

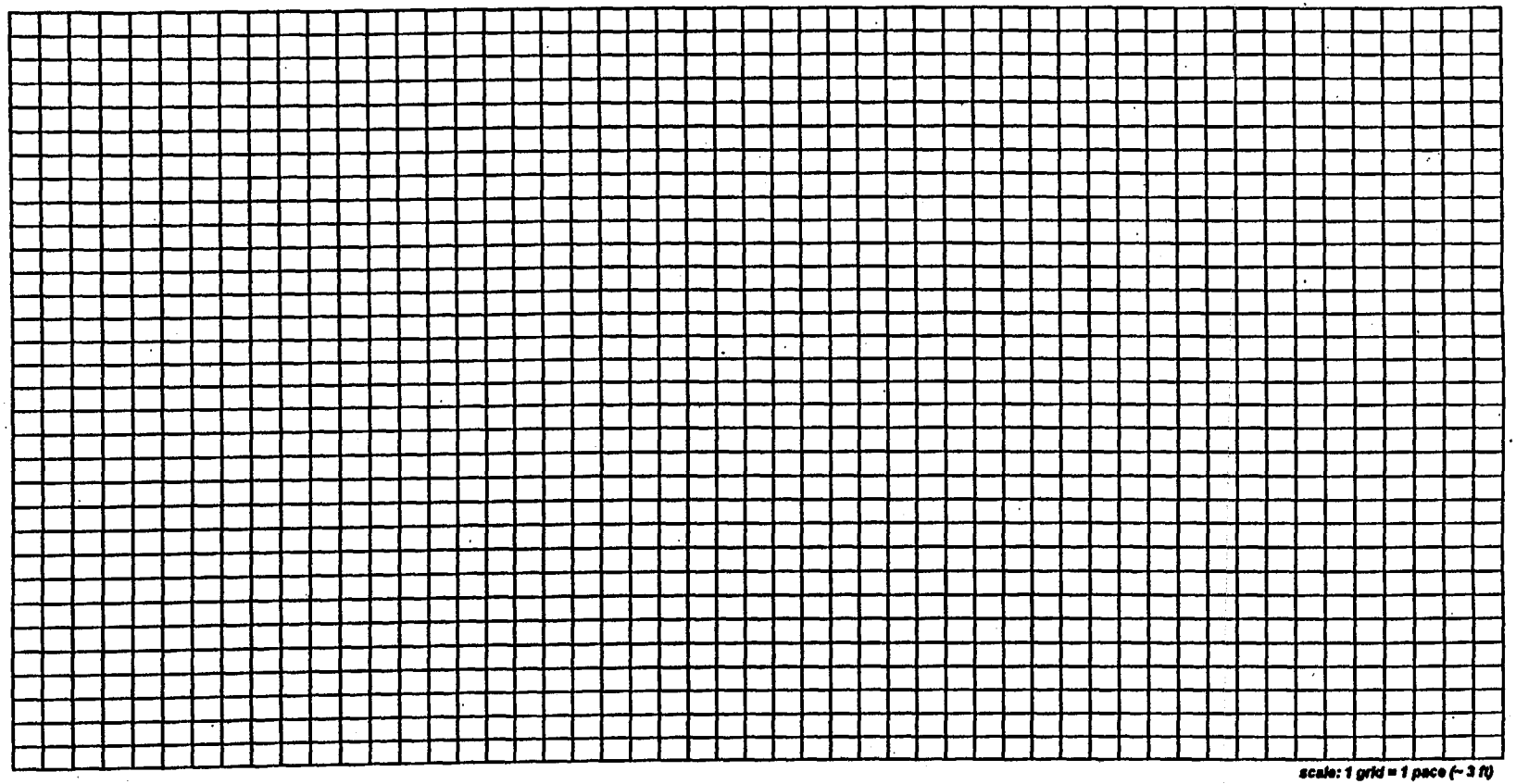
GARDEN PRESENT?	Yes	No
IN USE?	Yes	No
ADDRESS CONFIRMED BY RESIDENT?	Yes	No
WILLING TO ALLOW FURTHER SAMPLING?	Yes	No

Master Logbook Page _____

Field Diagram:

N

DIRECTIONAL ARROW



scale: 1 grid = 1 pace (~ 3 ft)

Sub Area	No. of Grids	Relative Dist. Between Samples (RDBS)	No. of Flags in Sub Area No. of Grids divided by the RDBS	No. of Each Flag (10 of each)
1	_____		_____	Red _____
2	_____		_____	
3	_____	Total Grids divided by 30 =	_____	Blue _____
4	_____		_____	
5	_____	_____	_____	Yellow _____
6	_____		_____	
7	_____		_____	
8	_____		_____	
Total Grids:			Total Flags:	Equal to 30? Y N

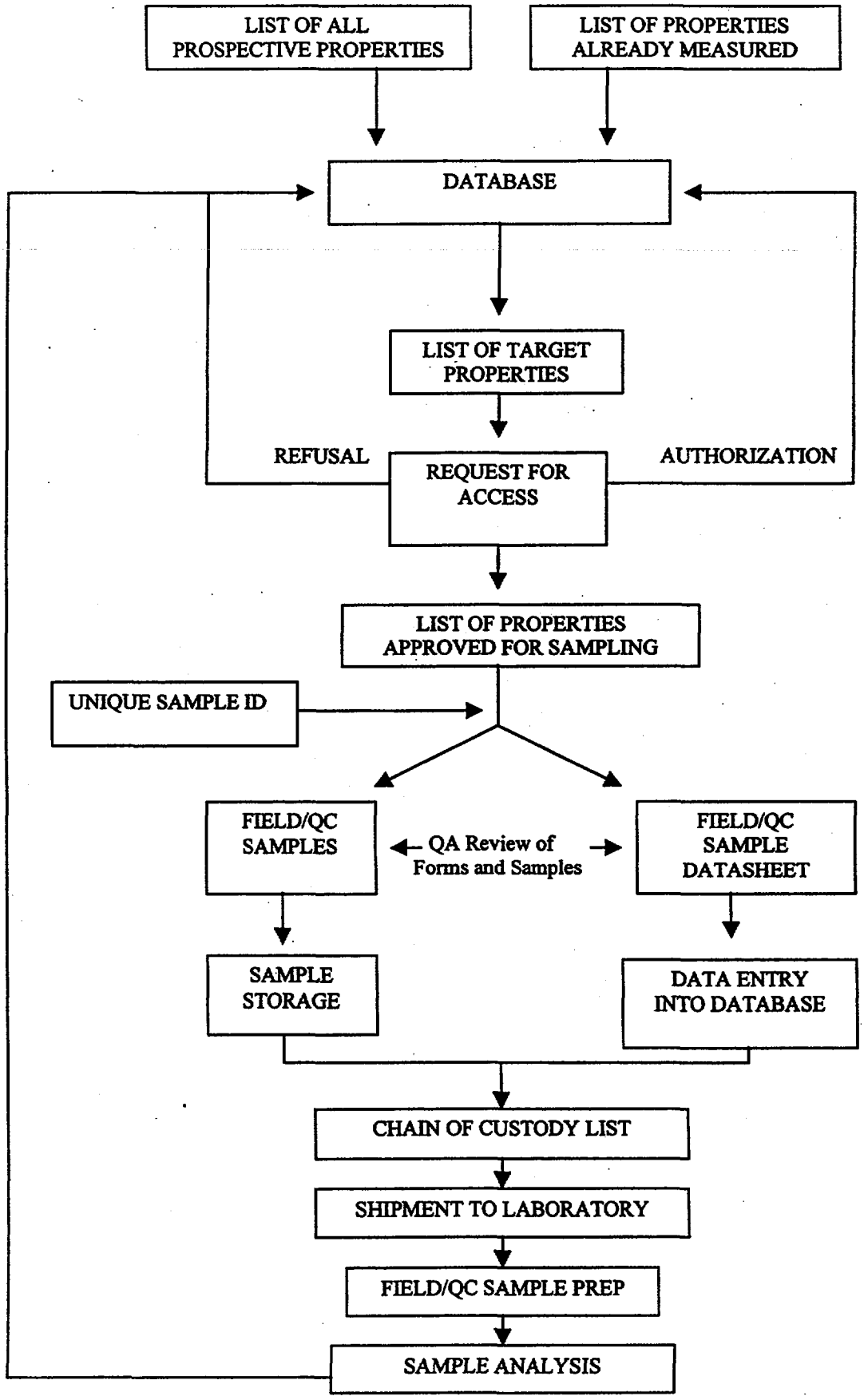
Samples Collected by: _____ _____
Signature *Date*

Logbook Page Reviewed by: _____ _____
Signature *Date*

Figure 1:

Phase III Sample Flow Chart

PHASE 3 SAMPLE FLOW CHART



TECHNICAL STANDARD OPERATING PROCEDURE
Surface Soil Sampling

EXAMPLE TEXT

Date: August 8, 2000 (Rev. # 0) SOP No. EPA-MURRAY-01

Title: SURFACE SOIL SAMPLING AT RESIDENCES FOR DETERMINATION OF EXPOSURE TO METALS

APPROVALS:

Author: _____USEPA, Region 8_____ Date: August 8, 2000

SYNOPSIS: A standardized method for exposure-based surface soil sampling is described. Protocols for sample collection, sieving, compositing, and sample handling are provided.

Received by QA Unit:

REVIEWS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Region VIII	_____	_____

EXAMPLE TEXT

SURFACE SOIL SAMPLING PROCEDURES

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for surface soil sampling to be used by employees of EPA Region VIII contractors/subcontractors supporting EPA Region VIII projects and tasks. This SOP describes the equipment and operations used for sampling surface soils in residential areas which will produce data that can be used to support risk evaluations. Site-specific deviations from the procedures outlined in this document must be approved by the EPA Region VIII Regional Project Manager, Regional Toxicologist, or On-Scene Coordinator prior to initiation of the sampling activity.

This SOP provides protocols for two different types of surface-soil sampling methods: discrete sampling and composite sampling. Depending on the data quality objectives outlined in the Project Plan, one of the following methods is appropriate.

2.0 RESPONSIBILITIES

Successful execution of the Project Plan requires a clear hierarchy of assigned roles with different sets of responsibilities associated with each role.

The Project Leader may be an EPA employee or contractor who is responsible for overseeing the surface soil sampling activities. The Project Leader is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the Project Plan. It is the responsibility of the Project Leader to communicate with the Field Personnel specific collection objectives and anticipate situations that require any deviation from the Project Plan. It is also the responsibility of the Project Leader to communicate the need for any deviations from the Project Plan with the appropriate EPA Region VIII personnel (Regional Project Manager, Regional Toxicologist, or On-Scene Coordinator).

Field personnel performing soil sampling are responsible for adhering to the applicable tasks outlined in this procedure while collecting samples at residences. The field personnel should have limited discretion with regard to collection procedures, but should exercise judgment regarding the exact location of the Sample Point, within the boundaries outlined by the Project Leader.

EXAMPLE TEXT

3. 0 EQUIPMENT

- Soil coring tool - Various makes of coring tools are acceptable and selection of the specific brand and make of tool should be specified in the Project Plan. Selection of the coring tool should be based on the individual characteristics of the soil to be sampled (e.g. clay, stony, soft etc.). At a minimum, the tool should be capable of retrieving a cylindrical plug of soil at least 3/4 inch in diameter and 3 inches long. A soil coring tool of this type is typically fabricated from stainless steel, has a hollow stem, is T-shaped and uses two handles to apply the force necessary for core collection. A plunger is used to press out the soil plug from the tip of the coring device. Plungers may be fitted with an adjustable stop to allow all but a given length of soil to be pushed from the coring tool. In all cases the procedures recommended by the manufacturers should be followed with regard to use of the coring tool. Coring tools with disposable plastic sleeves may be employed to minimize the decontamination effort.

- Collection containers - type to be specified in the Project Plan. Containers may be glass jars, plastic jars, or plastic bags.

- Trowel/Scoop/spoon - for collecting surface soil samples. Must be stainless steel.

- Gloves - for personal protection and to prevent cross-contamination of samples. May be plastic or latex. Disposable, powderless.

- Field clothing and Personal Protective Equipment - as specified in the Project Plan.

- Squeeze bottle -for dispensing potable (drinking) quality water. Used to clean and decontaminate sampling equipment.

- Squeeze bottle - for dispensing deionized water. Used to clean and decontaminate sampling equipment.

- Wipes - disposable, paper. Used to clean and decontaminate sampling equipment.

- Field notebook -used to record progress of sampling effort and record any problems and field observations.

- Permanent marking pen - used to label sample containers.

- Sieves - if specified in the Project Plan. U.S. Standard # 10 (capable of passing material < 2 mm) and U.S. Standard # 60 (capable of passing material < 250 µm). Used to remove gravel and debris in the field to minimize shipping weight. Sieves mesh should be constructed of stainless steel and designed for soil processing.

- Measuring tape or pocket ruler -used to measure the length of soil core in the soil coring device.

- Plastic Buckets - used to receive rinse water generated in the course of tool cleaning, rinsing sieves, and used to collect the discarded soil from the coring tool.

- Trash Bag - used to dispose gloves and wipes.

- 0.01M HCl – used for equipment decontamination.

4.0 SAMPLING PATTERN

Discrete sampling requires soil collection from a single location and is used as a measure of the concentration at a single Sample Point. Composite sampling requires soil collection from multiple (sub-sample) points. These soils are then mixed and used as a measure of the concentration averaged over the entire area (zone).

The Project Plan will specify the pattern and order of sample collection. If compositing is to be done, the Project Plan will identify the areas and patterns used to group samples.

Care should be taken to avoid tracking soil from one area to another. As samples are taken sequentially, care should also be taken not to contaminate an area yet to be sampled with the residue of the sample that is currently being taken. In general one should move in a single direction through the sampling area. If an area is known or suspected of having a higher concentration of metals, all other considerations being equal, it should be sampled last to prevent cross contamination.

5.0 COLLECTION OF DISCRETE SURFACE SAMPLES USING A SOIL CORING DEVICE

A new pair of plastic gloves are to be worn at each Sample Point.

EXAMPLE TEXT

Locate the Sample Point on the ground specified by the Project Plan and clean the area free of twigs, leaves, and other vegetative material that can be easily be removed by hand. If the specified Sample Point is occupied by a rock, cobble or other hard objects of sufficient size that are incapable of easy removal by hand, move the Sample Point to the closest accessible location.

Place the soil coring tool on the ground and position it vertically. Holding the tool handle with both hands, apply pressure sufficient to drive the tool approximately 3 inches into the ground while applying a twisting force to the coring tool. Remove the tool by pulling up on the handle while simultaneously applying a twisting force. If the sample was retrieved successfully, a plug of soil approximately four inches long should have been removed with the coring tool.

If the Project Plan calls for coring of soil covered by turf-like vegetation (lawn), the coring tool should be pushed through the sod and the root mass extracted along with the soil core.

Hold the soil coring tool horizontally or place it on the ground. Place the coring tool plunger with the two inch stop inside the coring tool and push the soil plug out of the coring tool until the stop is encountered and two inches of soil remains inside. Using a clean spatula or knife, remove the soil collected at depth greater than two inches from the end of the sampling tool. Allow this soil to fall into the plastic bucket designated for excess soil material. Remove the stoppered plunger from the soil coring tool and using the unstoppered plunger, push the two-inch soil plug from the coring tool so that it falls directly into the sample container. Seal, label, and store the container as specified in the Project Plan.

Decontaminate the equipment as described in Section 12.0.

6.0 COLLECTION OF DISCRETE SOIL SAMPLES USING A SCOOP OR TROWEL

A new pair of plastic gloves are to be worn at each Sample Point.

Locate the Sample Point on the ground specified by the Project Plan and clean the area free of twigs, leaves, and other vegetative material that can be easily be removed by hand. If the specified Sample Point is occupied by a rock, cobble or other hard object of sufficient size to be incapable of easy removal by hand, move the Sample Point to a the closest accessible location.

Open a clean sample container. Using the metal spoon or scoop, excavate a hole in the soil approximately 2 inches in diameter and 2 inches deep while placing the excavated material directly inside the sample container. The sides of the excavated hole should be close to vertical to avoid sampling that is biased in favor of the upper layer of soil. Seal, label, and store the container as specified in the Project Plan.

Because decontamination procedures are time consuming, it may be desirable have a quantity of scoops and spoons that may be used once and stored until the end of the day decontamination session.

7.0 COLLECTION OF COMPOSITE SAMPLES USING A CORING TOOL

A new pair of plastic gloves are to be worn in each Sampling Zone.

Locate the Sub-sample Point on the ground specified by the Project Plan and clean the area free of twigs, leaves, and other vegetative material that can be easily be removed by hand. If the specified Sub-sample Point is occupied by a rock, cobble or other hard object of sufficient size to be incapable of easy removal by hand, move the Sub-sample Point to a location closest to the original Sample Point.

Place the soil coring tool on the ground and position it vertically. Holding the tool handle with both hands, apply pressure sufficient to drive the tool approximately 3 inches into the ground while applying a slight twisting force to the coring tool. Remove the tool by pulling up on the handle while simultaneously applying a twisting force. If the sample was retrieved successfully, a plug of soil approximately three inches long should have been removed with the coring tool.

If the Project Plan calls for coring of soil covered by turf-like vegetation (lawn), the coring tool should be pushed through the sod and the root mass extracted along with the soil core.

Hold the soil coring tool horizontally or place it on the ground. Place the coring tool plunger with the two inch stop inside the coring tool and push the soil plug out of the coring tool until the stop is encountered and two inches of soil remains inside. Using a clean spatula or knife, remove the soil collected at depth greater than two inches from the end of the sampling tool. Allow this soil to fall into the plastic bucket designated for excess soil material. Remove the stoppered plunger from the soil coring tool and using the unstoppered plunger, push the two-inch soil plug from the coring tool so that it falls

directly into the sample container. Repeat the steps outlined above until all the sub-samples from a given zone have been collected in the sample container.

Decontaminate equipment as described in Section 12.0.

8.0 COLLECTION OF COMPOSITE SAMPLES USING A SCOOP OR TROWEL

A new pair of plastic gloves are to be worn in each Sampling Zone.

Locate the Sub-sample Point on the ground specified by the Project Plan and clean the area free of twigs, leaves, and other vegetative material that can be easily be removed by hand. If the specified Sub-sample Point is occupied by a rock, cobble or other hard object of sufficient size to be incapable of easy removal by hand, move the Sub-sample Point to a location closest to the original Sample Point.

Using the metal spoon or scoop, excavate a hole in the soil approximately 2 inches in diameter and 2 inches deep while placing the excavated material directly inside the compositing bowl. The sides of the excavated hole should be close to vertical to avoid sampling that is biased in favor of the upper layer of soil.

Repeat steps outlined above until all the sub-samples from a given zone have been collected in the sample container.

Decontaminate equipment as described in Section 12.0.

9.0 SITE CLEAN-UP

The Project Plan will address the methods used to fill holes generated by the sampling procedure. In general, it is desirable to fill sampling holes with clean, moist topsoil. The material should be poured into the hole and tamped down lightly. If sandy areas such as playgrounds are sampled, refilling the soil plug is not necessary.

Rinse water, the unused fraction of soil cores, the roots of vegetation removed during sampling, and any unused soil generated in the course of sieving must be disposed of as specified in the Project Plan.

EXAMPLE TEXT

10.0 RECORDING KEEPING AND QUALITY CONTROL

A field notebook should be maintained by each individual or team that is collecting samples as described in the Project Plan. The Project Plan will detail specific conditions which require attention, but at a minimum the following information should be collected.

EXAMPLE TEXT

This notebook information must include:

- date
- time
- personnel
- weather conditions
- a sketch of the sampling pattern that is filled in with sample identification numbers as the samples are collected
- locations of any samples and sub-samples that could not be acquired
- descriptions of any deviations to the Project Plan and the reason for the deviation.

Samples taken from soils with visible staining or other indications of non-homogeneous conditions should be noted. Draw a diagram that details the residence of each yard. Sample locations and sample numbers should be identified on the diagram.

11.0 SAMPLE PREPARATION

Because data generated from collected surface soils will be used in evaluations of risk for metals exposure, sieving is required to obtain particle sizes. The soil sieving process produces a uniform material whose concentrations can be more accurately measured using laboratory techniques.

The option of whether to sieve soils prior to shipment to the laboratory as well as the location of sieving operations should be specified in the Project Plan. Soil sample must be dried and sieved in a controlled environment (laboratory) rather than in the field. Composite samples should have their sub-samples mixed prior to sieving.

11.1 Drying the Soils

Soils must be sufficiently dry prior to sieving. This may be determined by performing a "squeeze" test. The soil plug is pinched between a freshly gloved thumb and index finger. If the soil fragments and becomes powdery, the sample may be regarded as adequately dry for sieving. Alternatively, if soil squeezed in the palm of a freshly gloved hand becomes cohesive and retains its shape after squeezing, the soil has too much moisture for sieving.

If samples are not sufficiently dry, they should be oven-dried. Oven-dried samples will be dried to constant weight in a constant temperature oven set at 103-105 °C.

EXAMPLE TEXT

Once soil samples have been determined to be adequately dry, the sample plug or scoop should be manually crushed and broken up by squeezing the material with a freshly gloved hand. If the sample contains a section of grass sod, the soil should be shaken from the grass roots allowing this soil to mix with the other soil that will be sieved. The grass sod plug should be subjected to the screening process along with the other soil. Under no circumstances should the sample be ground (either against itself or against the compositing bowl or the sieving screens) as grinding generates particles that would not otherwise exist as part of the soil matrix.

11.2 Sieving

Sieving will be performed for each sample using clean equipment. Unprocessed soils (defined here as "raw soil") should first be sieved using a #10 screen, allowing particles <2 mm to pass through its mesh. Soils passing through a #10 screen will be defined here as "bulk soil". A portion of the bulk soil may be retained for metals analysis. Another portion of the bulk soil should then be sieved using a #60 screen, allowing particles <250 μm to pass through its mesh. Soils passing through a #60 screen are referred here as fine soil ("fines"). A portion of the fines may also be retained for metals analysis. Refer to the Project Plan for details about which soil fraction is desired for analysis, or whether characterization of both soil fractions is required.

Sieving should be performed by pouring the soil sample on top of the sieve and shaking the screen rapidly back and fourth so that the material rolls over the screen mesh. The screen should occasionally be tapped against a hard surface to allow material to pass through mesh holes that have become clogged. Shaking should continue only as long as material above the screen contains particles smaller than the mesh opening. The screening process should not be used to break-up fragments of the soil core and materials should not be rubbed against the screen as a way of making them pass through the mesh.

The screens should be thoroughly cleaned prior each use. Decontamination procedures are described in Section 12.0.

12.0 DECONTAMINATION

Because decontamination procedures are time consuming, having a quantity of sampling tools sufficient to support decontamination at a maximum of once per day is recommended. All sampling and sieving equipment must be decontaminated prior to reuse.

The procedures to decontaminate all equipment is outlined below:

1) Remove visible soil.
2) Rinse equipment with potable water.
3) Rinse equipment with deionized water.

Washing should be performed by sequential immersion of the equipment in buckets partially filled with these solutions. If necessary, a brush should be used to remove soil material from screens and coring tools. Equipment should be set on clean toweling to dry. Equipment should be visibly dry before being used again.

Wipes, gloves, and rinse solutions must be disposed or stored properly as specified in the Project Plan.

13.0 GLOSSARY

Project Plan - The written document that spells out the detailed site-specific procedures to be followed by the Project Leader and the Field Personnel.

Sample Point - The actual location at which the sample is taken. The dimensions of a sample Point are 3/4" in diameter and 2" deep (core technique) or 2" across by 2" deep (spoon/scoop technique).

Discrete Sampling - A sample program in which material taken from a single Sample Point.

Composite Sampling - A sample program in which multiple Sample Points are compiled together and submitted for analysis as a single sample.

Sample zone - A unit of surface area subjected to a given sample program. A given zone usually is thought to contain similar metals concentrations or to be defined by a single set of exposure parameters.

Raw soils - Soil with sticks, leaves and debris removed but otherwise unprocessed.

Bulk soils - Raw soil that has passed through a U.S. Standard #10 sieve (< 2 mm).

Fine soil - Bulk soil that has passed through a U.S. Standard #60 sieve (< 250μm).

14.0 REFERENCES

USEPA, 1995. Residential Sampling for Lead: Protocols for Dust and Soil Sampling, Final Report, EPA 747-R-95-001, USEPA, March 1995, 38 p.

American Society for Testing and Materials, 1995. Standard Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometery Techniques, ASTM Designation: E 1727 - 95, October 1995, 3 p.

Attachment 4 - Example Data Assessment and Response Actions (C1) Text

Example Text for Assessment and Response Actions (C1)

4.0 Assessment and Oversight (C)

The following sections describe activities for assessing the effectiveness of the implementation of the project and associated QA/QC. The purpose of the assessment is to ensure that the project plan is implemented as prescribed. The elements include assessments and response actions and reports to management as described in the following sections.

4.1 Assessment and Response Actions (C1)

4.1.1 Audits (C1)

Assessment of field activities and laboratory analyses will be conducted through oversight of analytical procedures through field and laboratory audits. The purpose of the oversight (audit) activities will be to document field sampling and analysis procedures, to determine if activities are proceeding in accord with project requirements and to document any changes, additions or deletions that have occurred during field sampling and analysis and to identify and immediately implement any corrective actions.

Field audits will evaluate field procedures to ensure that activities are proceeding in accord with the project plan. If conflicts are noted, these must be addressed so that project requirements are met.

Laboratory audits will evaluate laboratory procedures to ensure that they follow Good Laboratory Practices (GLP) Guidelines and to ensure that they do not conflict with project requirements. If non-conformances are noted, these must be addressed so that project requirements are met. Additionally, laboratory analyses may also be assessed through submittal of performance evaluation (PE) samples. PE samples may be used as a tool for evaluating the accuracy of laboratory analyses. PE samples are standards submitted blind to the laboratory and are typically submitted prior to submittal of investigative samples and then also submitted blind along with the investigative samples. The concentration is unknown to the laboratory analyzing the sample, but known to the submitter. The laboratory reported results for the PE samples will be evaluated by comparison to the certified values provided by the contractor providing field and laboratory oversight.

Other audits that will be carried out over the course of the project include:

- Review and verification of procedures followed as part of real-time control charting of QC samples analyzed via field and contract laboratory procedures
- Evaluate the flow of electronic data
- Review and verification of hardcopy data

Audits will review the data flow, verify data entry procedures and evaluate whether data

management QC protocols are being observed. If audits resulting from review of any of the procedures reveal that project requirements are not met, then corrective action for the deviation must be requested, reviewed and reported. Results for all audits must be documented and submitted to the USEPA Remedial Project Manager. Information in the report includes:

- Type of System Audit (Field, Laboratory, Data Management, etc.)
- Date of audit
- Summary of procedures reviewed
- Results of the review/audit including any non-conformances noted
- Corrective Action Request(s) [CAR], if non-conformance noted
- Date by which CAR must be received with response

If a CAR is required, a follow-up audit must be performed withing 5 working days upon receipt of the CAR to ensure that corrective actions were implemented. A Follow-up audit report describing the new findings must be submitted to the USEPA RPM.. More detailed information regarding corrective action procedures is provided in the next section.

4.1.2 Corrective Action Procedures (C1)

Corrective actions for non-conformances are designed to eliminate the sources of deficiencies or errors. Corrective actions taken may include but are not limited to: correcting deficiencies or errors or correcting inadequate procedures. If corrective action is deemed necessary following an audit, each step in the following procedures must be documented:

- Identify the deviation
- Request a corrective action
- Report the problem the USEPA RPM
- Review the corrective action response
- Perform a follow-up audit to ensure the deviation is not recurring

Appropriate corrective action procedures for specific laboratory or field quality control samples are outlined in the subsequent paragraphs. Refer to Table 1 for recommended corrective action.

ATTACHMENT A

Table 1: Required Quality Control and Recommended Corrective Action

QC Performed	Sample Matrix	Minimum Frequency	Acceptance Criteria					Recommended Corrective Action				
			General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06	General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06
Blind Standard	Residential, Alley, School and Park Soils and Indoor Dust	Approximately 120-135 samples. 30 samples for each of 3 lower spike levels (Standards A, B, C) and about 10-15 samples for each of 3 higher spike levels (Standards D, E, F).	Instrument- and site-specific performance criteria are provided as available. Control limits were developed using data generated during Phase IIIA sampling and analysis activities. In addition, recoveries will be monitored using control charting. Control charting will be performed in accord with standard USEPA protocols and may be used to develop and/or modify site-specific performance criteria, as necessary.	See GR	See GR	See GR	Control Limits - *UNDER DEVELOPMENT* Arsenic: Std A: Std B: Std C: Std D: Std E: Std F: Lead: Std A: Std B: Std C: Std D: Std E: Std F: Action Limits Arsenic Std A: Std B: Std C: Std D: Std E: Std F: Lead: Std A: Std B: Std C: Std D: Std E: Std F:	Verify the percent recovery calculations. If calculations are correct, then the FQAC should review all other associated QC samples to determine if the other QC samples are acceptable. If all other QC samples are acceptable, qualify the entire analytical batch as estimated (J). However, if any two blind standards analyzed on consecutive days fall outside the control limits or if the measured value of the blind standard falls outside the action limits, and all other QC samples analyzed with that batch are acceptable, then contact EPA to discuss the appropriate action. Potential corrective action could include, but is not limited to: re-preparation and reanalysis of all samples associated with the affected blind standard or modification of acceptance limits.	See GR	See GR	See GR	See GR
Confirmation Samples	Residential, Alley, School and Park Soils	10% of surface soils collected.	A graphical comparison of the XRF analysis and the corresponding ICP, ICP-MS or GFAA metals analysis should also be prepared. This comparison should include a linear regression with the calculated correlation coefficient (r). R should be >0.9.	N/A	N/A	N/A	N/A	Validate and/or verify the data. Determine if outliers are affecting the correlation. If so, remove the outliers and recalculate r. If no source of error can be identified, report the r value as is.	See GR	See GR	See GR	See GR

Table 1: Required Quality Control and Recommended Corrective Action

QC Performed	Sample Matrix	Minimum Frequency	Acceptance Criteria					Recommended Corrective Action				
			General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06	General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06
Continuing Calibration Blank (CCB)	Residential, Alley, School and Park Soils and Indoor Dust	every 10 samples in the analytical batch (before the CCV),*or once every 2 hrs. during the analytical run, whichever is more frequent. A CCB must be run after the last CCV after the last sample.*	N/A	≤ 1 x PQL	<PQL for each analyte	< PQL for each analyte.	N/A	Evaluate instrument or system, locate source of contamination, and perform a system blank to determine if the system blank meets acceptance criteria. Continue to perform system blanks until acceptance criteria are met. *Reanalyze the blank and associated investigative samples. If the absolute value of the blank exceeds the PQL, correct the problem, recalibrate instrument, verify the calibration, and reanalyze the preceding 10 analytical samples or all of the analytical samples analyzed since the last good calibration blank.*	All samples following the last acceptable CCB must be reanalyzed.	If the average recoveries are not within 3 standard deviations of the background mean, terminate analysis, correct the problem, recalibrate the instrument. Re-analyze the previous 10 investigative samples.	Cause of the problem must be determined, corrected, and all samples analyzed since the last acceptable CCB must be re-analyzed. If a lab consistently has concentration values > 3 x IDL, the IDL may be indicative of an estimated IDL, and must be re-evaluated.	N/A
Energy calibration check	Soil	1) Beginning of each working day. 2) After batteries are changed. 3) After instrument has been shut off. 4) Any other time when operator believes that drift is occurring.	N/A	N/A	N/A	N/A	Manufacturer's recommended count time should be used for the check: pure elements (Fe, Mn, Cu, Pb) are usually used for this check	N/A	N/A	N/A	N/A	Reposition pure element sample and reanalyze. If criteria are still not met, energy calibration must be performed as described in the manufacturer's manual. Do not analyze investigative samples until criteria are met.
Continuing Calibration Verification (CCV)	Residential, Alley, School and Park Soils and Indoor Dust	every 10 samples in the analytical batch (after the CCB) For XRF analyses, once per batch of investigative samples.	N/A	90-110% recovery of known value	90-110% recovery of known value	90-110% recovery of known value	Arsenic (ppm): NIST 2709: 14-22 NIST 8704: 11U-28 NIST 2711: 84-126 NIST 2710: 501-751 Lead: NIST 2709: N/A NIST 8704: 120-180 NIST 2711: 930-1394 NIST 2710: 4426-6638	Verify the percent recovery calculations. If calculations are correct, evaluate the standard to determine if it is faulty. If it is, prepare a new standard and reanalyze the CCV and all associated investigative samples. If necessary, recalibrate the instrument. *Do not continue analysis until the problem is solved. If std > control limits, stop analysis, correct problem, recalibrate instrument, verify calibration, and reanalyze all samples analyzed since the last good CCV.*	Discontinue sample analysis, determine cause of the problem, correct the problem, and recalibrate the instrument.	See GR	See GR	reanalyze check sample, if still not acceptable, recalibrate instrument; all samples analyzed since the last acceptable CCV must be reanalyzed.

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			General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06	*General Requirements (GR)*	*GFAA Method 7060 & 7421*	*ICP Method 6010 B*	*ICP/MS Method 6020*	*XRF SOP #MK-VBI70-06*
Equipment Blank	Residential, Alley, School and Park Soils and Indoor Dust	5% of all decontaminations performed on each type of equipment	target analytes <1 x PQL; 5-10 x PQL for laboratory-induced contaminants	See GR	See GR	See GR	N/A	Suggests that field sampling-induced contamination may have occurred. Evaluate all associated QC samples. If all other QC samples are within prescribed acceptance limits, but the equipment blank is not (e.g., positive identifications of target analytes are observed), *contact the USEPA immediately to determine whether resampling and/or reanalysis is required.*	See GR	See GR	See GR	N/A
Field Duplicate (FD)	Alley Soils	5% of all surface soil samples. (1 field duplicate per 20)	RPD < 25% or,the absolute difference should not exceed 1 x MDL. A graphical comparison of the original and field duplicate samples should also be prepared. Recoveries will also be monitored using control charting. Control charting will be performed in accord with standard USEPA protocols and will be used to establish site-specific performance criteria. This comparison will include a linear regression and will report the calculated correlation coefficient. R should be >0.9.	See GR	See GR	See GR	See GR	Verify the RPD calculation. If this is correct, determine if matrix interference or heterogeneous samples are factors in the poor RPD. If matrix effects or heterogeneous samples are not observed, reanalyze the method duplicate and associated investigative samples. *If appropriate, re-extract or redigest and reanalyze the method duplicate and associated investigative samples.*	See GR	See GR	See GR	See GR
Blind Field Split (BS)	Residential, School and Park Soils	5% of all surface soil samples. (1 field duplicate per 20)	RPD < 25% or,the absolute difference should not exceed 1 x MDL. A graphical comparison of the original and field duplicate samples should also be prepared. Recoveries will also be monitored using control charting. This comparison will include a linear regression and will report the calculated correlation coefficient. R should be >0.9. Additionally, control charting will be performed in accord with standard USEPA protocols and will be used to establish site-specific performance criteria.	See GR	See GR	See GR	See GR	Verify the RPD calculation. If this is correct, determine if matrix interference or heterogeneous samples are factors in the poor RPD. If matrix effects or heterogeneous samples are not observed, reanalyze the method duplicate and associated investigative samples. *If appropriate, re-extract or redigest and reanalyze the method duplicate and associated investigative samples.*	See GR	See GR	See GR	See GR

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			General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06	General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06
Initial Calibration Blank (ICB)	Residential, Alley, School and Park Soils and Indoor Dust	beginning of each run or beginning of every new shift (whichever is more frequent)(before the ICV)	N/A	≤ 1 x PQL	< 1 x PQL	< PQL for each analyte.	N/A	Evaluate system, locate source of contamination, and perform a system blank to determine if the system blank meets acceptance criteria. Perform instrument maintenance until analysis of system blanks meets acceptance criteria. *Do not begin analysis of investigative samples until criteria are met.*	Determine the cause, correct the problem, and recalibrate the instrument before any samples are analyzed.	See GR	See GR	N/A
Initial Calibration Verification (ICV)	Residential, Alley, School and Park Soils and Indoor Dust	beginning of each run *and end, after the last analytical sample.* or beginning of every new shift (whichever is more frequent)(after the ICB)	N/A	90-110% recovery of known value	90-110% recovery of known value	90-110% recovery of known value	*Arsenic (ppm):* NIST 2709: 14-22 NIST 8704: 11U-28 NIST 2711: 84-126 NIST 2710: 501-751 Lead: NIST 2709: N/A NIST 8704: 120-180 NIST 2711: 930-1394 NIST 2710: 4426-6638	Verify the percent recovery calculations. If calculations are correct, evaluate the standard to determine if it is faulty. If it is, prepare a new standard and reanalyze the ICV and all associated investigative samples. If necessary, recalibration the instrument. *Do not continue analysis until the problem is solved.*	*Calibration* curves must cover the appropriate concentration range, as determined by Project specifications. Blanks and standards should produce an absorbance of 0.0 - 0.7	*Terminate* analysis, correct the problem, and recalibrate the instrument. Any sample analyzed under an out-of-control calibration must be re-analyzed.	*Terminate* analysis, correct the problem, and recalibrate the instrument. Any sample analyzed under an out-of-control calibration must be re-analyzed.	*Follow corrective procedures as* outlined in operator's manual.
Laboratory Control Sample (LCS) or Standard Reference Material (SRM)	Residential, Alley, School and Park Soils and Indoor Dust	5% or 1 per batch (whichever is more frequent)	must be within manufacturer's established acceptance limits.	80-120% of known value	See GR	See GR	N/A	Verify the percent recovery calculations. Evaluate the standard to determine if it is faulty. If it is, prepare a new standard and reanalyze the LCS and associated investigative samples. If necessary, recalibrate the instrument. *Do not continue analysis until the problem is solved.*	Re-run the LCS or SRM one time, if still not acceptable, all samples analyzed after the last acceptable LCS must be re-prepped and re-analyzed.	See GR	See GR	N/A
Matrix Spike (MS)	Residential, Alley, School and Park Soils and Indoor Dust	5% or 1 per batch (whichever is more frequent)	N/A	80-120% recovery of known value	75-125% spiked sample recovery (spiking level plus original sample level)	75-125% recovery of known value	N/A	Verify the matrix spike percent recovery calculations and evaluate the LCS percent recoveries. If the calculations are correct and the LCS recoveries are acceptable, determine if matrix interference is a factor in the poor recoveries. If matrix effects are not observed, reanalyze the matrix spike and associated investigative samples. *If appropriate, re-extract or redigest and reanalyze the matrix spike and associated investigative samples.*	Interference test must be conducted (see SW 846 Method 7060 and 7421 for description of interference tests).	Locate source of the problem, correct it, and re-analyze any samples that were run during the out of-control condition.	Locate source of the problem, correct it, and re-analyze any samples that were run during the out-of-control condition.	N/A

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Method Blank (MB)	Residential, Alley, School and Park Soils and Indoor Dust	5% or 1 per batch (whichever is more frequent) For XRF: each working day or whenever contamination is suspected by the operator. Manufacturer's *recommended* count times per source should be used	Refer to method-specific requirements.	< 1 x PQL; or 10% of lowest concentration for each analyte.	< 1 x PQL except for common laboratory contaminants which may be 5-10 x PQL. *If any analyte concentration is > PQL, the lowest conc. of that analyte in the associated samples must be 10x more than the conc. found in the blank.*	< PQL except for common laboratory contaminants which may be 5-10 x PQL. *If any analyte concentration is > PQL, the lowest conc. of that analyte in the associated samples must be 10x more than the conc. found in the blank.*	< MDL for each analyte.	Evaluate instrument, locate source of contamination, perform system blanks to confirm that the system blank meets performance criteria. Re-analyze method blank and associated samples. *If method blank is still above the acceptance criteria, re-extract or redigest the method blank and all associated samples.*	See GR	See GR	See GR	Check probe window; blank sample should be checked for contamination. Re-analyze all samples since the last acceptable MB.
Method Duplicate (MD)	Residential, Alley, School and Park Soils and Indoor Dust	5% or 1 per batch (whichever is more frequent)	RPD < 25% (if 5 x MDL), absolute difference 1 x MDL	See GR	RPD < 25% (if 5 x MDL), absolute difference 1 x MDL	RPD < 25% (if 5 x MDL), absolute difference 1 x MDL	See GR	Verify the RPD calculation. If this is correct, determine if matrix interference or heterogeneous samples is a factor in the poor RPD. If matrix effects or heterogeneous samples are not observed, reanalyze the method duplicate and associated investigative samples. *If appropriate, re-extract or redigest and reanalyze the method duplicate and associated investigative samples.*	See GR	See GR	See GR	See GR
Post-digestion Spike (PDS)	Residential, Alley, School and Park Soils and Indoor Dust	as required; if matrix spike does not meet acceptance criteria	N/A	85-115% of known value	85-115% recovery of post spiked sample	75-125% of known value.	N/A	Verify the percent recovery calculations. If these are acceptable and the spike addition produces a minimum level of 10 times to a maximum of 100 times the instrument detection limit (IDL), matrix effects should be suspected. No further action is required.	If recovery <40%, dilute sample by factor of 5-10 and rerun. If after dilution recovery still <40%, report problem to USEPA.	Sample must be diluted and re-analyzed to compensate for possible matrix effects. Results must agree to within 10% of the original determination.	Sample must be diluted and re-analyzed to compensate for possible matrix effects. Results must agree to within 10% of the original determination.	N/A
System Blank	Residential, Alley, School and Park Soils and Indoor Dust	as required; if other blank samples are not meeting acceptance criteria	< 1 x MDL	See GR	See GR	See GR	N/A	Evaluate system, locate source of contamination, and perform a system blank to determine if the system blank meets acceptance criteria. Perform instrument maintenance until analysis of system blanks meet acceptance criteria. *Do not begin analysis of investigative samples until criteria are met.*	See GR	See GR	See GR	N/A

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QC Performed	Sample Matrix	Minimum Frequency	Acceptance Criteria					Recommended Corrective Action				
			General Requirements (GR) [a]	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06	General Requirements (GR)	GFAA Method 7060 & 7421	ICP Method 6010 B	ICP/MS Method 6020	XRF SOP #MK-VBI70-06
Instrument Blank (IB)	Residential, Alley, School and Park Soils	5% or 1 per batch (whichever is more frequent)	< 1 x MDL	See GR	See GR	See GR	See GR	Evaluate system, locate source of contamination, and perform a system blank to determine if the system blank meets acceptance criteria. Perform instrument maintenance until analysis of system blanks meet acceptance criteria. *Do not begin analysis of investigative samples until criteria are met*.	See GR	See GR	See GR	check probe window; blank sample should be checked for contamination. If not contamination present, re-analyze and/or re-prep all samples since the last acceptable IB.

[a] General Requirements should be followed in all cases, except where the requirements of the method are specified. In those cases, follow general requirements as stated and then refer to specific requirements for each method.

MDL - Method Detection Limit
RPD - Relative Percent Difference
PQL - Practical Quantitation Limit
IDL - Instrument Detection Limit
SRM - Standard Reference Material
U - Undetected
N/A - Not Applicable